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ABSTRACT

Recently some psychologists have shown a renewed interest in the relationship between cognition and emotion and have begun to examine the relationship between the representation and processing of factual and emotional information. To investigate the role of emotional state in personal memory retrieval, a study was undertaken to replicate and extend the mood-congruency effects found in previous studies. In this case, however, happiness was compared to anger rather than to sadness as in previous studies. To examine the effect of emotional mood on the production and content of autobiographical memories, 48 college students (24 males, 24 females) were induced to feel either happy or angry and were then asked to recount a childhood or an adolescent memory. These recalls were scored for affect words, social themes portrayed, and number of words used to recount the memory. The results indicated that subjects' mood predicted the valence of affect words present in the memory. Social themes varied as a function of both subjects' mood and subjects' gender. Fluency, number of words produced, was influenced by gender and mood such that females were slightly more fluent than males; moreover, females were most fluent while happy while males were most fluent while angry. The results offer some support for the associative model for mood dependent recall and also suggest that the particular mood may influence recall independently of mood congruency effects. (Author/BL)

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Emotional Mood States and the Recall of Childhood Memories

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Abstract

We investigated the effect of emotional mood on the production and content of autobiographical memories. Subjects in the study were induced to feel either happy or angry and then asked to recount a childhood or an adolescent memory. These recalls were scored for affect words included, social themes portrayed and number of words used to recount the memory. Subject's mood predicted the valence of affect words present in the memory. Social themes varied as a function of both subjects' mood and subject's gender. Fluency, number of words produced, was influenced by gender and mood such that females were slightly more fluent than males; moreover, females were most fluent while happy while males were most fluent while angry. The results offer some support for the associative model for mood dependent recall and also suggest that the particular mood may influence recall independently of mood congruency effects.

Introduction

Present events in people's life tend to remind them of prior experiences. These memories consist of both the factual information about the experience as well as the emotional state that was associated with the experience. Because of this interassociation between factual information and affective information, new facts can cue old facts and associated feelings in memory and new emotional experiences can cue old emotional experiences and their associated facts. For example, seeing a dog that looks like one's former pet may remind one of the death of that pet and the sadness associated with that death. Likewise, while one is feeling sad, one might begin to reminisce about sad events and remember the death of the cherished pet.

Recently, some psychologists have had a renewed interest in the relationship between cognition and emotion and have begun to examine the relationship between the representation and processing of factual and emotional information. There has been significant interest in how emotional states can act as contextual cues for memories of events (Bower, Monteiro & Gilligan, 1978) and how emotional states might cause people to selectively learn or selectively retrieve particular memory events (Bower, Gilligan & Monteiro, 1981). These concerns reflect an interest in how an emotion might be represented as information in a memory structure and how it might interact with other information. Psychologists primarily interested in the

emotional process and how it might influence the ongoing cognitive processes have long postulated that the experience of an emotional state, as distinct from the semantic label of the emotion, can have qualitative effects on the ongoing cognitive processes (e.g. Tomkins, 1962; Panksepp,1982). This hypothesis is extremely interesting and intuitively appealing but there has been little research on this issue to date.

Mood and Context Dependent Memory

The phenomenon of context dependent memory is closely related to that of state dependent memory. In studies of the effects of alcohol and other drugs on memory (see Overton, 1973, for a review; see also Storm and Caird, 1967; Darley, Tinklenberg, and Roth and Atkinson, 1974; Eich, 1980; and Parker, Birnbaum and Noble, 1976), some drugs have been found to have disruptive effects on learning and recall. One specific effect which has been reported and is of interest here is state dependent retrieval. The classic state dependent retrieval effect is one where information learned in a particular drug state (sober or intoxicated) is best recalled when the learner returns to that state. This description is qualified by the caveat that not all drugs produce these effects and those which do sometimes produce asymetric effects, usually finding a state dependent effect during intoxication but not sobriety. They remain, however, intriguing.

Similar results are found when one alters the social context in which a person learns information. Abernathy (1940) found that learners performed best on a test if the test was administered in the same room in which the learning had occurred. Smith, Glenberg, and Bjork (1975) replicated these results. It has been argued elsewhere (Bower, Monteiro, and Gilligan, 1978) that both the state dependent retrieval effects and these context dependent memory effects occur for similar reasons. Both the physiological changes and the contextual changes can be viewed as incidental stimuli which are encoded with the target information during learning. These bits of information now become potential retrieval cues for the target information. When one returns to the same physiological state or social context, one reinstates those incidental cues and, thusly, increases the overall number of cues available for retrieving the information. Bower, Monteiro and Gilligan (1978) hypothesized that one's emotional state could act as such a learning context. Subjects were hypnotized, induced to feel either happy or sad and taught a list of words. They were hypnotized a second time to feel either happy or sad and taught another list of words. On a third occasion, they were hypnotized, made either happy or sad, and asked to recall both lists of words learned while they had been experiencing the mood state which matched their mood during the recall situation. The prediction indicating a state-dependent type effect was confirmed. This effect has been replicated

(Bartlett, Burleson, & Santrock, 1982; Goerss & Miller, 1983; Bartlett and Santrock, 1979; and Shere, Lisman & Spear, 1984). Macht, Spear and Lewis (1977) had similar findings using emotional arousal that was produced by the threat of mild electrical shock. There have been several failures to replicate this effect (Bower & Mayer, 1985; Ellis, 1983) indicating that it may be less robust than first thought.

Mood Congruent Memories

Another emotion related memory phenomenon which might have produced these memory biases is mood-congruent recall. In associative models of memory (Anderson, 1970; Anderson and Bower, 1973), information is presumed to be represented as discrete units. These units are connected to each other by associations. The more closely bits of information are related in the person's experience the stronger the association between these bits of information in memory. When one bit of information is accessed in memory, it tends to activate neighboring bits of information: it is called "priming" the information. It can be argued that part of one's emotional state can be seen as being represented in memory at a node with associations of varying strength to other events which share the same affective valence (see Bower, 1981). If so, a happy mood, for example, should prime happy or positive events in memory and make them more accessible for recall. In a study done by Monteiro and Bower (reported in Bower and Gilligan, 1980), Subjects were hypnotized to feel either happy or sad and,

then, were asked to recall their childhood experiences. Happy Subjects tended to recall more happy events than did sad Subjects. This finding was replicated by Snyder and White (1982) and similar findings were reported by Gilligan and Bower (1984) and Nasby and Yando (1982). Though these results could be explained by a context dependency hypothesis, they might also occur because of the congruency between the affect associated with the Subjects' experienced mood state and the affect associated to the memory event.

The Study

In order to investigate further the role of emotional state in personal memory retrieval, we designed a study to replicate and extend the mood-congruency effects found in previous studies by comparing happiness to anger, instead of comparing happiness to sadness. Because both happiness and anger are high arousal, we are less likely to confound arousal with affective valence, as may have happened in previous studies comparing happiness with sadness. The recall task is slightly different from those reported by Bower (1981), Gilligan and Bower (1984) and Snyder and White (1982) since we were interested in subjects elaborating on a single memory as opposed to listing many, single-phrase memories. This was done in order to analyze the content of the memory in respect to the actors present, the feelings of the actors involved, the theme or social topic of the event and the amount of detail reported. In addition, we have chosen to

investigate sex differences in emotion-cued recall especially since some social-developmental research suggests that anger-related experiences (aggression & dominance) differ for males and females (for review, see Maccoby & Jacklin, 1974). Unfortunately, the data are not precise concerning the nature of these differential experiences relative to anger. Since women are reported to be more verbally fluent than men, it is possible that women will give more detail regardless of their mood. Further, clinical lore suggests that certain negative emotions such as severe depression inhibit fluency. Therefore, we will count the number of words in each memory vignette.

It is predicted that a subject's mood will cue mood congruent memories. It is expected that the content of these memories will be qualitatively different for males and females, and that females will have greater verbal fluency overall for each memory vignette. It is believed that mood should affect the amount of detail reported and that happiness may produce more detailed memory than anger.

Method

Subjects. Twenty-four male and 24 female undergraduates from introductory psychology participated in order to earn optional course credit.

Procedure. Subjects were assigned randomly by group to each condition. They entered the laboratory alone, in pairs or triplets, depending upon scheduling. No larger groups were used

because our experience indicates that the mood induction procedure is attenuated in a larger group. After discussion of the study, full explanation of the procedure and the signing of participation slips, Subjects filled out a mood check list to ascertain which moods they were experiencing upon entering the study. The mood induction followed. We used the same procedure as Monteiro & Bower, 1978, Bower, Monteiro & Gilligan, 1978, and Bower, Gilligan & Monteiro, 1981, except that mood induction instructions were tape-recorded by Monteiro to standardize the procedure instead of being given orally. The induction includes a standard relaxation technique (e.g., Weitzenhoffer & Hilgard, 1962) followed by suggestions that the subjects imagine an experience in which they had the emotional state appropriate for their experimental condition (happy or angry). They were then told that they would be able to maintain this mood state while doing the experimental task. During the induction time the room was darkened, subjects relaxed in a contour chair and they were asked to focus their attention on a light projected on the wall about 8 feet from their chairs.

Following the mood induction, subjects again filled out the mood check list to verify the effectiveness of the mood induction. Finally subjects wrote a childhood or adolescent memory vignette. The instructions for the vignette were " Briefly describe an adolescent (childhood) memory telling what happened, to whom and your feelings about the situation."

After an intervening task (unrelated study) the above procedure was repeated with the same or the different affect, depending upon experimental condition. This yielded a 2x2 design such that subjects are either happy or angry while writing the first vignette and either happy or angry while writing the second vignette. Each Subjects wrote one childhood and one adolescent vignette.

Results

Mood induction effectiveness. Before and after each mood induction procedure subjects filled out a mood scale that contained eleven mood categories and allowed an intensity rating of 1-7 for each possibility. These were used to indicate subjective impressions of the mood induction effectiveness.

The mood induction was highly effective for both men and women. Subjects reported before mood induction that their primary moods were a mixture of enjoyment and interest and a few reported a small amount of anxiety. Following the happy mood induction, subjects reported a medium to high level of happiness, the same degree of interest as before the mood induction and slightly heightened surprise. The negative moods, if checked at all, were checked by only one subject and were indicated to be at a low level of intensity. After the anger mood induction subjects reported a medium to high level of anger and slightly lower levels of sadness, contempt/disgust, and frustration. Happiness was seldom checked and other moods occurred infrequently.

As in Table 1, the primary mood subjects report is the one induced. The level of mood change is clearly different before and after mood induction. Happy mood induction is associated with happy subjective feelings and lower levels of other positive mood states. Anger mood induction is associated with angry subjective feelings and lower levels of other negative mood states.

Insert Table 1

Mood congruency. All affect words used by Subjects in the vignettes were underlined and subsequently counted. As shown in Table 2, Subjects in the happy mood condition primarily use the affect terms happy or joy and a few other positive affect terms. Subjects in the anger condition primarily use the affect terms anger and fear and a few other negative affect terms. This demonstrates that Subjects were tending to choose memories which

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Insert Table 2 about here

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closely reflected their induced mood states (X^2 = 51.05, df = 3, p .001). There are no significant sex differences in usage of affect terms and there are no differences between childhood and adolescent vignettes in usage of affect terms.

Actors. All people and pets mentioned by Subjects in the vignettes were underlined and subsequently counted and

categorized. As shown in Table 3, there are no clear differences between mood conditions nor do men and women differ in their references to people in the stories. There is a non-significant tendency for men to refer to peers and siblings more than to parents or other adults. This difference is less apparent for women and may be reversed in the anger mood condition if a larger number of subjects are involved.

Insert Table 3 about here

Social themes: Recalls were categorized as follows:

1. Play. Concerns activities of play and probably fun. May or may not involve other people, but if it does, the focus is on the play, not on the relationship.

2. Affiliation. Concerns close relationships among special people. Story primarily deals with the making, breaking and maintenance of relationships.

3. Aggression/Harm. Focus of the story is on physical or verbal abuse. Someone is attacked or threatened or the hero attacks or threatens. Also includes parental punishing of children.

4. Achievement-Success. Concerns doing well or attempting to do well (even if failure occurs) at an important activity. Winning or losing a prize or game are common.

5. Need gratification. Focus of story is receipt or denial of a desired object or event.

Coding procedure. Each story was coded as a whole. The first coder read and subjectively labeled the thematic topic of a sample of the vignettes. The categories generated in this fashion were defined more formally as above and presented to a second coder. Using the above scheme the two coders categorized all the stories. Simple agreement on the codes was 86%.

Table 4 shows the distribution of themes by sex and experimental condition. The happy condition was after the first happy mood induction or when both mood inductions were happy. The anger condition was for the first anger mood induction or when both mood inductions were anger. The mixed condition is the second mood induction when the opposing mood was first: anger after happy or happy after anger. In the anger condition, men related more aggressive themes than in the happy or mixed conditions, while women related more affiliation themes than they did in the happy condition. Both men and women related more success/achievement themes, play themes and need gratification themes in the happy condition. Men are more likely than women to write about aggressive themes in the anger condition. Women are more likely to write about affiliative themes in the anger condition (X^2=9.11, df=1, p .005). None of the other thematic differences are large or significant.

Insert Table 4 about here

Amount of detail--verbal fluency. The number of words in each vignette was counted. The data presented in Figure 1 collapses across childhood and adolescent vignettes. A 2x2 ANOVA indicates that there is no mood effect (F=0.78, df = 1,92, ns) a marginal effect for sex (F = 3.43, df = 1, 92, p .10) and a significant interaction of sex and mood (F = 6.32, df = 1, 92, p .025). Men are more verbally fluent in the anger mood induction and women are more verbally fluent in the happy mood induction.

Insert Figure 1 about here

Though not all the data points are strictly independent, the ANOVA analyses should produce a more conservative test of the hypotheses.

Discussion

This study replicated the mood congruency effect (Bower, Gilligan & Monteiro, 1981) and extended it to the mood of anger indicating that mood induction does tend to prime memories with similar affective valence even when the moods have fairly comparable arousal levels. The anger mood primed memories that dealt with negative emotion, primarily anger, and the happy mood primed memories that dealt with positive emotion, primarily happiness. This effect is assumed to occur because of the association between the representation of the mood in memory and the representation of the affect associated with the experience.

(See Bower, 1981, for an elaboration of the association network mode.) There were no significant differences between men and women in the people remembered (peers, parents, etc.) or their feelings; however, theIR themes were different in the anger condition. In the anger mood condition men remembered episodes with aggressive themes and women remembered episodes with affiliative themes.

Unexpectedly, the most striking result was the interaction between gender and mood induction on verbal fluency. In the induced anger condition men were somewhat more fluent than women and in the induced happy condition women were much more fluent than men. Though this was not predicted, it would be consistent with the socialization literature in that men are assumed to be socialized to function in aggressive (or presumably angry) situations while women are assumed to avoid angry, aggressive situations (For a general discussion see Maccoby & Jacklin, 1974, p. 323-327).

For the mood congruency effect found by us and others, the model described by Bower (1981) seems adequate. This would seem reasonable if we consider only the portion of an emotion which is represented as bits of information in the semantic network. However, our results demonstrating differences in fluency as a function of gender and mood are not adequately predicted by this model. The weakness in the model is that it does not sufficiently describe possible emotional differential or thought

processes occurring during the emotional experience. Metaphorically, different emotions may operate as differently as different drugs do in producing state-dependent memories.

It is possible to interpret our results as indicating that the emotional state may influence fluency as a process independent of its influence on retrieval of congruently coded information. That is, not only is the associative effect a factor, the process induced by a particular mood may be a factor independent of association. If this effect can be demonstrated and clarified, it would add appreciably to our knowledge of affect/cognition interactions.

Although our report is the first related to fluency, and the first to report sex differences, there are other studies reporting that positive and negative moods have different effects on another task--categorization. Isen and Daubman (1984), for example, report that people in a positive mood create more inclusive categories and sort both words and colors more inclusively. In a list recall task Monteiro and Haviland (in preparation) found that people in a positive mood make more errors due to tendency to identify photos as recalled that were never presented--another aspect of overinclusiveness.

The goal of follow-up studies will be to isolate the effect of mood on fluency. Specifically, if simple verbal fluency is affected, then a simple test of verbal fluency should demonstrate that men are more fluent after anger mood induction and women are

more fluent after happy mood induction. This would be a very strict test of the hypothesis that mood induction influences fluency regardless of content.

A second possible interpretation of our results suggests that fluency per se is not influenced, but that the amount of material available in happy or angry memories is different for men and women. If this is the case, then recalling a happy, angry or sad event without the mood induction should demonstrate the same effect. In this case directly instructing the subjects to write about a happy, sad or angry memory would produce the same effect. In addition as a second condition, to more firmly establish the effect, one would attempt to obtain an elaboration of the memory. Requesting subjects to indicate what type of detail is <u>not</u> available for recall as well as what is available. It is unlikely that men and women cannot remember equal numbers of discrete happy and angry events since other studies indicate that if they are asked merely to list, not to elaborate, memories that there are equal numbers of episodes under each affect category for each sex (Waldfogel, 1948). It is only elaboration that is questioned.

We have found that the emotional state may influence fluency as a process independent of its influence on retrieval of congruently coded information. The fluency effect could occur for several reasons: Production: The emotion may inhibit verbal behavior, thus individuals may have the information, but not be

stimulated to elaborate the content. The emotion may produce defensive behavior so that the person chooses not to reveal information. Encoding: Certain emotions may have an overall inhibitory effect on learning or encoding new information. The emotions may have a selective learning effect (Bower, Gilligan & Monteiro, 1981) such that different information will be encoded in the same situation. The amount of information of one type in a situation may be less than the amount of information of another type in the same situation. As an artifact this would produce different amounts of information being encoded in different mood states and hence limit verbal output. The selective learning effects of mood states may interact with social experience to produce differential encoding for each sex.

In summary, our results both offer support for the associative model for certain types of data and they suggest that additional research is needed to discover whether all emotional mood states do have the same type of effects or whether each possibly can be aligned with different processes.

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Author Notes

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Table 1

Mood Induction Effectiveness

	Before Mood Induction		After Happy 1		After Anger 1	
	Women	Men	Women	Men	Women	Men
a[1]	2.66(2.0)[2]	2.05(1.64)	5.06(1.14)	3.33(2.31)	.58(0.79)	.94(1.12)
b	3.69(1.78)	3.82(1.2)	3.12(1.99)	3.67(1.78)	1.33(1.50)	1.88(1.54)
c	.58(1.12)	.86(0.92)	1.29(1.86)	1.05(1.38)	.05(1.0)	.69(1.14)
d	.41(0.73)	.45(0.98)	-	.33(0.65)	2.75(2.93)	1.81(1.86)
e	.17(0.46)	.21(0.63)	-	.17(0.39)	4.42(1.44)	3.94(1.53)
f	.11(0.41)	.17(0.47)	-	.17(0.39)	3.00(2.0)	1.69(2.06)
g	.52(1.12)	.40(0.67)	-	.17(0.58)	.67(1.72)	.62(1.41)
h	.69(1.07)	.38(0.62)	-	.25(0.62)	.92(1.83)	.38(1.26)
i	1.10(1.18)	1.78(1.5)	.47(0.08)	1.58(2.31)	1.83(2.03)	1.94(1.77)
j	.31(0.71)	.28(0.59)	-	-	2.67(2.42)	2.12(1.71)
k	.14(0.35)	.14(0.52)	-	-	1.08(1.98)	.62(1.45)

[1]The categories are a. Enjoyment/Happiness, b. Interest/Excitement, c. Surprise, d. Sadness/Despair, e. Anger, f. Contempt/Disgust, g. Fear, h. Shame/Shyness, i. Anxiety, j. Frustration, k. Guilt

[2]Mean intensity (Standard deviation) on a 7 point scale

Table 2

Feeling Terms

Mood	Happy		Angry	
Sex	Men	Women	Men	Women
Feeling Terms				
Joy and Positive	14	10	1	2
Anger and Negative	5	4	13	13
None or Mixed	6	6	7	7

Table 3

People

Mood	Happy		Angry	
Sex	Men	Women	Men	Women
People				
Peers and Sibs	17	18	24	17
Parents and Adults	10	15	13	21

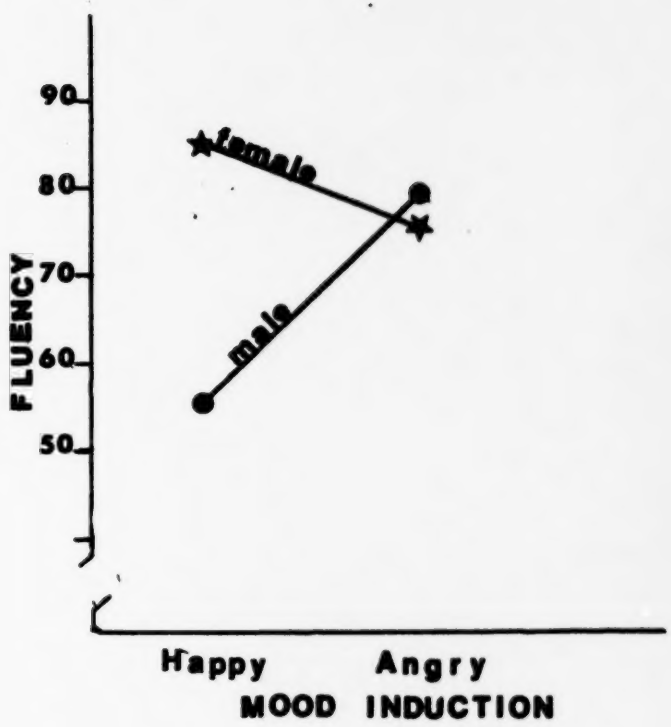
Table 4

Themes

Themes	Happy		Mixed		Angry	
	Men	Women	Men	Women	Men	Women
Aggression	8	5	5	3	15	7
Success	4	5	3	3	1	0
Affiliation	0	1	1	4	2	6
Play	1	3	1	0	0	1
Need Gratification	1	3	1	1	0	1
Not Codeable	4	1	1	1	0	3

Figure Caption

Figure 1. Verbal fluency (number of words) for males and females in recall under conditions of happy and angry mood induction.


90
80
70
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FLUENCY
female
male
Happy
Angry
MOOD INDUCTION